Los Alamos Neutron Science Center (LANSCE)
Superconducting RF Structures Lab (SRF Lab) Capabilities

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Activities in the SRF Lab

- Assembly, tuning and vertical testing of superconducting RF structures for various projects
  - Elliptical cavities, single and multi-cell cavities for high velocity particles
  - Spoke cavities for low velocity particles
- Past and present projects
  - Small-scale tests with 3-GHz 1-cell cavities (~1998)
  - Accelerator Production of Tritium (APT, 1998-2001)
  - Advanced Accelerator Applications (AAA, 2001-2003)
  - New Material study for SRF applications such as MgB_2 (2003-)

Facilities in the SRF Lab

- Cavity tuning and test control room
- Cavity measurement area
  - Cryostats and inserts with removable radiation shield
- Chemical Polishing Facility at MST Division
  - System for elliptical and spoke cavities with BCP solution circulating
  - Maintain the temperature at <15 °C with a chiller
- Clean room for clean assembly and rinsing of the cavity
  - 2600 ft^2 (260 m^2) (Class 100 and 1000)
  - High-pressure rinsing system (1000-1500 psi)
  - Ultra-pure water system (2000 gallons/day, 1500-gallon storage tank)
  - Ultrasonic cleaning system (40 kHz, 90 gal. 3 baths)

Facilities at the SRF Lab

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2600 ft² class-100 Clean room, 10-ft high

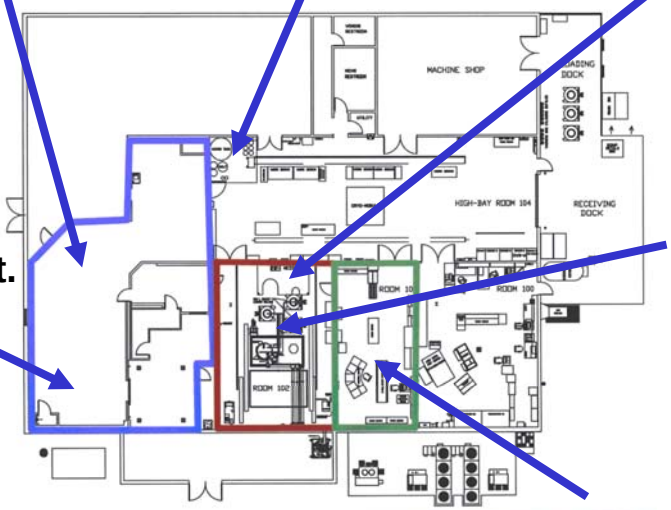
Ultra-pure water with 2000 G/day and 1500 G storage tank

cryostat inserts

High-pressure rinse in a clean room.

140 ft.

100 ft.



Building MPF-17

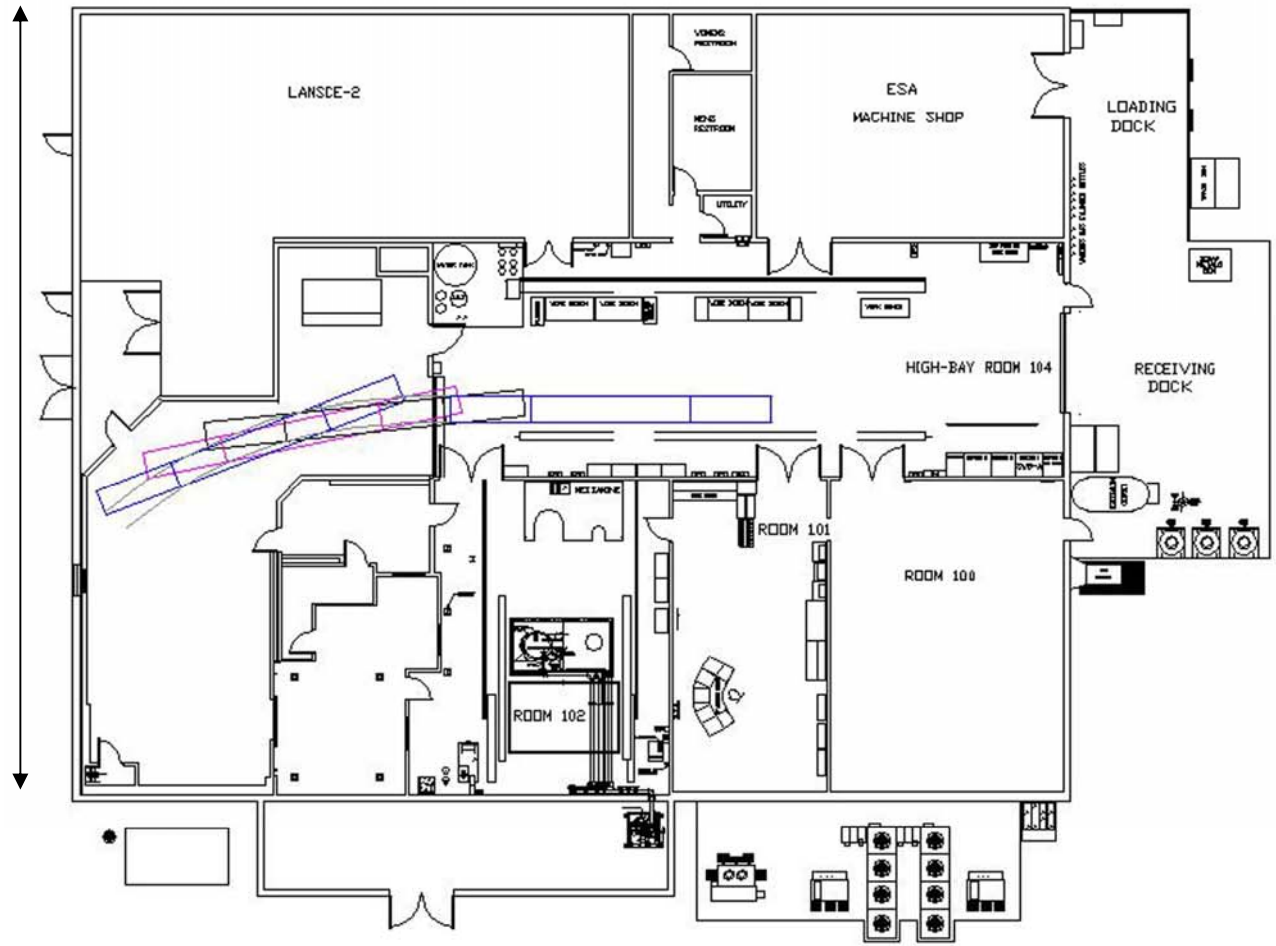
Cryostats with movable radian shield

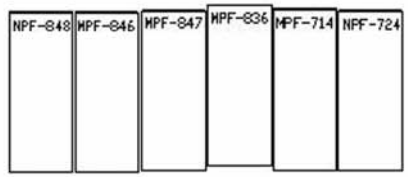
Control, tuning

The existing SRF Lab could be used as a training ground for the R&D on industrialization

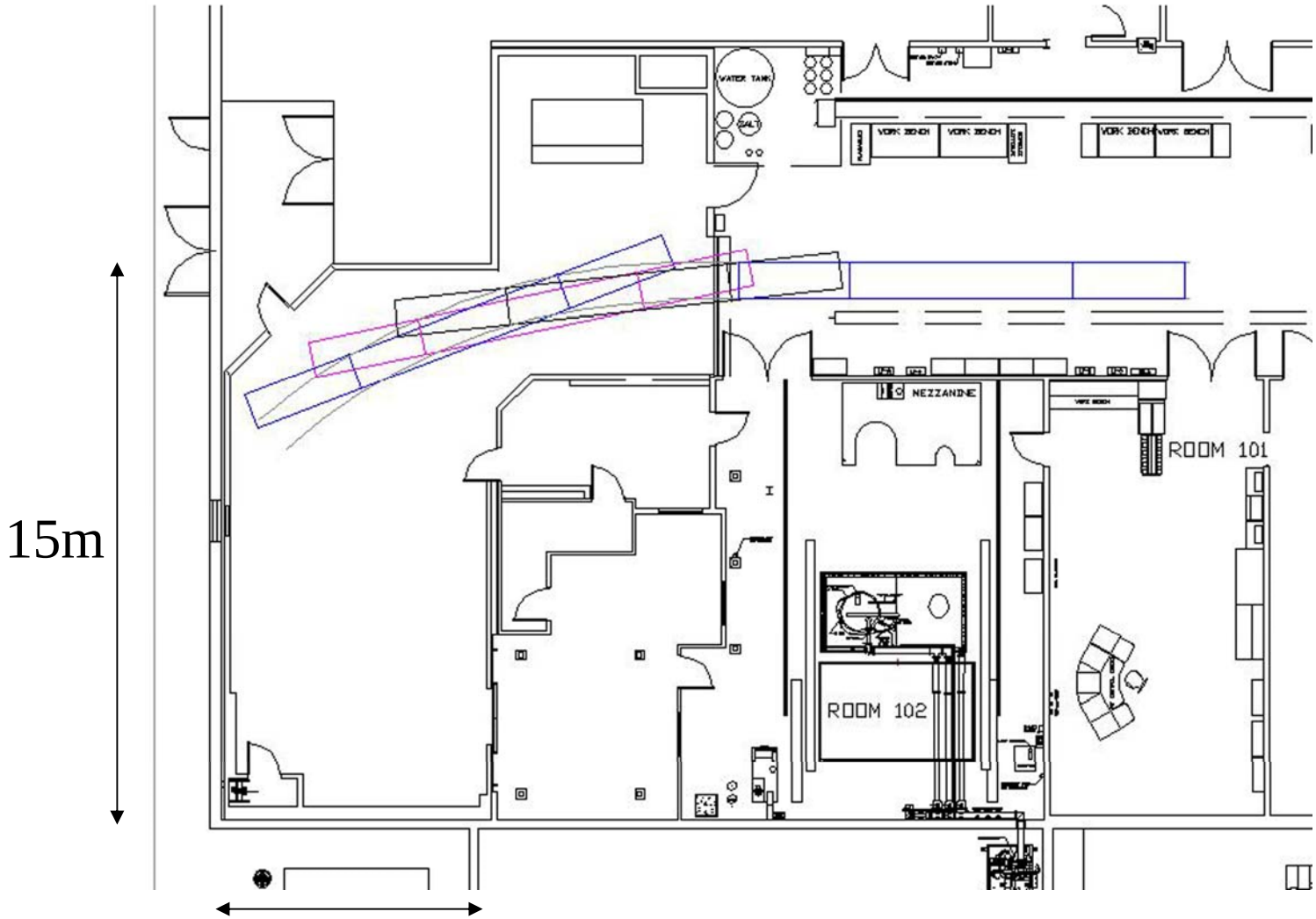
43m

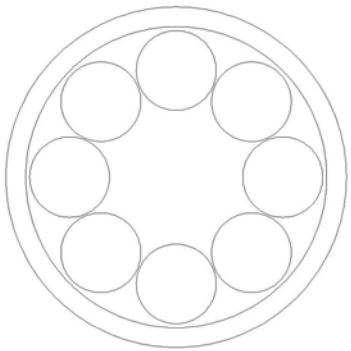
30m

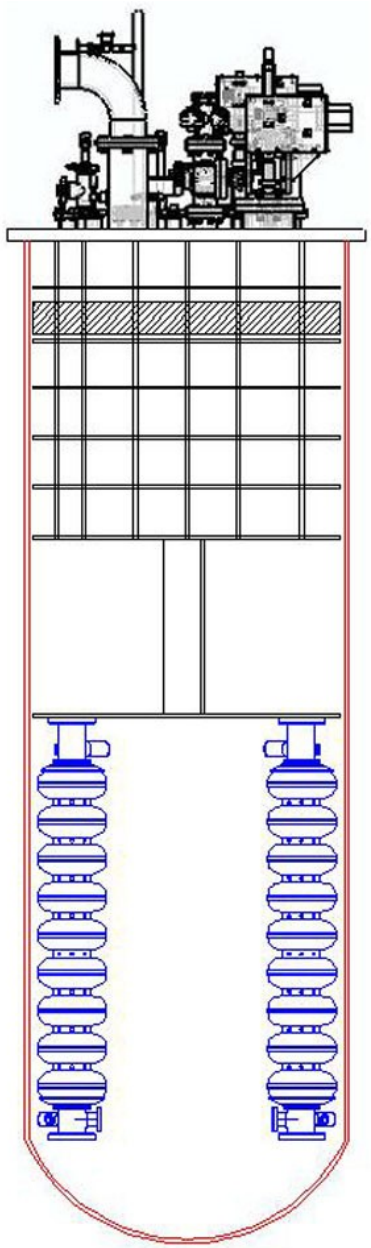




8-Cavity chain for the 12.5m cryomodule







Existing vertical cryostat with 8 TESLA 9-cell cavities in it, which enables us to test 8 cavities by filling the cryostat with liquid helium only once

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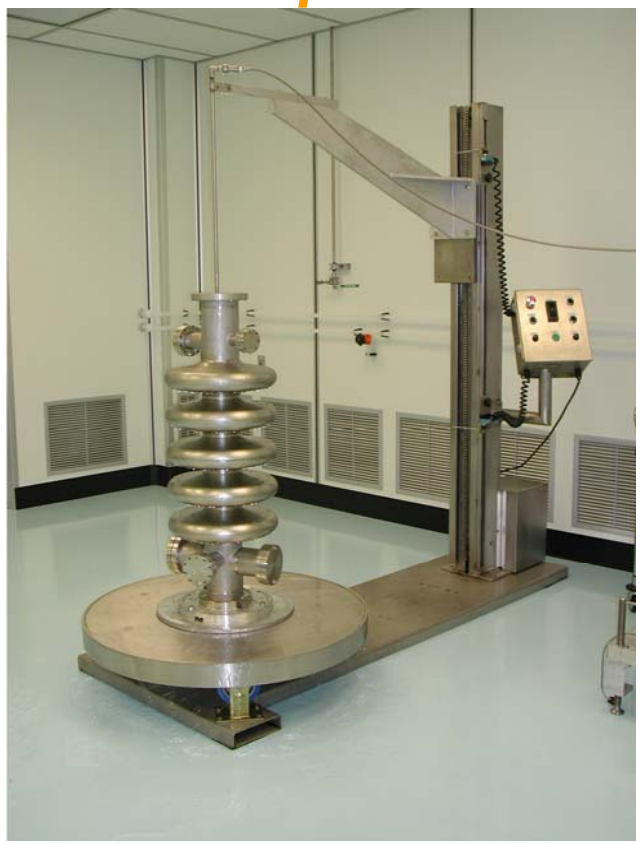
This 2,600 ft^2 (260 m^2) clean room dedicated for assembling SRF cavities.

High-pressure rinsing system. While the cavity is rotating on the turn table at ~ 30 rpm, water jets at 1,000-1500 psi move up and down automatically and rinse off the particles and chemical residues from the inner surface of the cavity.



Shown is a 5-cell ATP cavity
~1.1m long
~0.4 m in diameter

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Ultrasonic cleaning system to degrease, clean, and rinse the components for SC cavities and power couplers in the clean room. (three 90-gallon baths with 40-kHz oscillators)

Ultra-pure water system that can produce 2,000 gallons per day of de-ionized water with a resistivity (purity) of > 18 MΩ·cm. Shown in the center is a 1,500-gallon storage tank.

Current HPR of one TESLA 9-cell cavity needs ~2000 L (500 gallons)

This has the capacity of high-pressure rinse TESLA 9-cell cavities 3 times.

38-inch (~1m) diameter, 10-ft (~3m) deep cryostat with radiation shield

Two 38-inch (~ 1m) diameter cryostat inserts.
~2m vertical space available under the thermal shield plates.

With minor mods, this could test up to ~8 TESLA 9-cell cavities with one fill of liquid helium (~1500 liters).

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What needs to be done to determine whether these facilities are good enough for the ILC cavities?

- Compare the facilities with the ones at DESY and upgrade them if necessary, but if the necessity is uncertain, use the existing one
- High-pressure rinse, re-assemble and measure the performance of some of the high gradient cavities measured at DESY, and compare them with the DESY results. (Since we do not have the EP capability, we cannot go back to EP, but can go back to BCP if necessary.)